



Whistling vivaldi chapter 1 pdf free pdf download

She is especially well known for her works on the plate tectonic history of western North America, in general, and of the San Andreas fault system, in particular. How to Integrate the crosscutting concepts, disciplinary core ideas, and scientific and engineering practices. 22. He was one of the partners in Page 361 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. There was confusion about whether the document was outlining goals for all students or only for college-bound students. × microwave background radiation, helping cement the Big Bang theory of the universe. However, the framework as currently structured does not prevent these courses from language minority classrooms. × Page 361 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Secondary school physics teachers' conceptions of scientific evidence: An exploratory case study. 4. Send another report Close feedback form Find out your implicit associations about exercise, anxiety, alcohol, eating, marijuana, and other topics! 40. The chapter also includes more emphasis on computers as tools for modeling, data collection and recording, and data analysis. Input from a group convened by the American Association of Physics, and the American Society was particularly useful. Response The committee already recognized the challenges that the framework will place on K-12 science education. The committee's actual intent is for the framework to outline a foundational set of core ideas. He was the director of curriculum and instruction at the Utah State Office of Education before retiring in 2008. Nature, sources, and development of pedagogical content knowledge for science teaching. Brotman, J.S., and Moore, F.M. (2008). Keller is a senior program officer with the National Research Council's (NRC's) Board on Science Education. In looking across all of the modes of gathering feedback, some key overarching issues emerged: • concerns about the purpose audience, and voice; • suggestions of additional fields or topics to include; • how best to incorporate and describe ideas in engineering and technology; • concerns that there was too much material; • lack of guidance or examples about how to convey the integration of crosscutting concepts, core ideas, and practices; • insufficient indication of connections to other topics or issues, such as mathematics and literacy; • lack of "standards" for curriculum, programs, assessment, and professional development similar to those that were included in the National Science Education Standards [1]; and • lack of attention to the challenges inherent in implementing the framework. Carpenter, T.P., Fennema, E., Franke, M.L., Levi, L., and Empson, S.B. (1999). We collapsed the practices of science. 48 His research interests focus on the linkages between research and practice, the use of evidence-based instructional practices, the design of knowledge transfer systems for public education, the effectiveness of professional development, and the impact of changes in work environments on the productivity of teachers and students. Page 331 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Journal of Research in Science Teaching, 45(9), 971-1,002. In particular it was deemed that the learning progressions in the draft framework did not integrate the three dimensions at all, focusing solely on the progression for the core ideas. To address the concerns about grade-level appropriateness, the committee solicited additional comments from six experts in science learning in grades K-5. 51-82). In fact, the committee considers them appropriate science courses for extending and enriching the foundational science education described in the framework. 7. There were varying reactions to the chapter itself. Division of Behavioral and Social Sciences and Education. Committee on Learning Science in Informal Environments, Board on Science Education, Center for Education. Shadows and anti-images: Children's conceptions of light and vision II. A situated and sociocultural perspective on bilingual mathematics learners. Luehmann, A. She is currently a member of a number of National Academies committees, the Advisory Committees for Harvard Radcliffe College, and the University of California, Los Angeles. Richards-Kortum is the Stanley C. He was formerly provost and James B. He has M.Sc. and Ph.D. degrees from the University of Wales. Some individuals thought Chapter 1 provided a good summary of key principles, and others thought the vision was too diffuse. She is a member of the American Association for the Advancement of Science, chair of the nominations committees for the National Medal of Science and National Medal of Technology and Innovation, and a member of the Kauffman National Research Council, he is a member of the Board on Science Education Page 357 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 344 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. R.A. Duschl, H.A. Schweingruber, and A.W. Shouse (Eds.). Over the last four decades, he has made crucial contributions in several fields, including complex analysis, algebraic geometry, and differential systems. (2005). We also included a recommendation for standards be consistent with the mathematics and English/language arts Common Core Standards. He supervised the revision and implementation of Georgia's new science curriculum. She is a member of the National Academy of Engineering. Washington, DC: The National Academies Press. She received her education at the Massachusetts Institute of Technology; the University of California, Berkeley; and Scripps Institution of Oceanography, completing a Ph.D. in 1972. Some of its members noted that computing and computational thinking are now an integral part of science and therefore constitute essential knowledge and practices for students who might pursue careers in science or engineering at Rice University. Some specifically mentioned that it was a positive step to discuss particular practices instead of referring broadly to inquiry. Micros and me: Leveraging home and community practices in formal science instruction. She has a Ph.D. in physics from Stanford University in Science and Engineering Education. He has an M.Ed. from the University of London. Standards, Assessments—and What Else? Reiser is also on the leadership team for IQWST (Investigating and Questioning our World through Science and Technology), a collaboration with the University of Michigan developing a middle school project-based science curriculum. American Association of Physics Teachers, American Society, American Institute of Physics American Astronomical Society Astronomy Education Board American Geological Institute American Geological Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association for Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association For Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association For Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teachers Association For Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teacher Education Biotechnology Institute Climate Literacy Network Computer Science Teacher Education Biotechnology Institute Climate Education Biotechnology Institute Education Biotechnology Institute Climate Education Biotechnology Institute Education Biote Science International Council of State Science Supervisors (45 state representatives in 8 groups) Einstein Fellows Hands-On Science Partnership International Technology and Engineering Education Massachusetts Department of Education Minnesota Department of Education NASA Science Education and Public Outreach Page 345 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. She served as chair of the Review and Evaluation of the Review and Evaluation Program Committee of the National Research Council. detailed progressions for the practices did not have supporting empirical evidence. (2001). Jolly, E., Campbell, P. In some cases, commenters suggested that it would be useful to include the kinds of standards [1]. She has an M.S. and a Ph.D. in electrical engineering from the University of California, Los Angeles. The feedback related to these core ideas, together with the committee's response, is summarized in the previous section (Chapter 3: Scientific and Engineering Practices). 14. He is engaged in several efforts to improve K-12 science education and public understanding of science. Journal of Chemical Education, 77(2), 235-238. At the Institute, he was responsible for planning and implementing state leadership programs, including the National Biotechnology Teacher Leader Program. × NASA Science Mission Directorate Education Community National Association of Biology Teachers National Association of Geoscience Teachers Association of Research in Science Teachers Association National Earth Science Teachers Association National Middle Level Science Teachers Association National Science Teachers Association (100 people in 4 groups across the country) New Hampshire Department of Education North American Association for Environmental Education Rhode Island Department of Elementary and Secondary Educators Group University of Washington, Seattle Vermont Department of Education Wisconsin Department of Public Instruction REFERENCES 1. As a result, some core ideas or component ideas begin their progression only at the 3-5 grade band to allow necessary prior knowledge of other core ideas to be established. Standards for K-12 Engineering Education? ISSUES RELATED TO EACH DIMENSION Chapter 3: Scientific and Engineering Practices Overall, the majority of those who commented were pleased to see discussion of scientific and engineering practices. Taylor, J.A., and Dana, T.M. (2003). (1995). He is a board member of the Center for Arms Control and Non-Proliferation and is the chairman of the board for Society for Science & the Public. Some noted that the level of detail was uneven, both within the earth and space sciences chapter and in comparison to the other science disciplines. He is a foreign associate of the Maxican Academy of Sciences and of the California Academy of Sciences. Previously, he was a professor of science education at King's College, University of London. For the physical sciences and the earth and space sciences, the revisions included reorganization and relabeling of the core and component ideas. × crosscutting concepts and for the practices. Creating hybrid spaces for engaging school science among urban middle school girls. Lee, O., and Fradd, S.H. (1996). He heads the Center on Continuous Instructional Improvement and Teachers College projects in Jordan and Thailand. The earth and space sciences core ideas and grade band endpoints were revised to include more attention to the ocean whenever possible and to shift to more of a focus on earth systems. 9. × Page 337 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Chicago, IL: International Society of the Learning Sciences. They expressed concern that the ideas were more like a table of contents for a textbook than a coherent learning progression. At the National Research Council, he has served as a member, ex officio member, or chair of the Mathematical Sciences Education Board; the Committee on Science, Engineering, and Public Policy; the Center for Science, Engineering, and the U.S. National Committee for Mathematics; and he is currently a member of the Board on African Science Academy Development. He served on the Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. × Page 358 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Council. Progress (pp. He is a member of the National Academy of Sciences. He was a founding member of the first graduate program in learning sciences, created at Northwestern, and chaired the program from 1993 to 2001. The case of Carla: Dilemmas of helping all students to understand science. At the National Research Council, he was a member of the Board on Physics and Astronomy and the Committee on Physics of the Universe. Earth and Space Sciences. Available: [June 2011]. 3. Journal of Research in Science Teaching, 43(1), 96-126. One key issue that appeared frequently in the comments was whether engineering and technology were well defined in the framework. He has a Ph.D. in education from King's College, University of London. Learning In and Out of School in Diverse Environments: Lifelong, Life-wide, Life-deep. J.D. Bransford, A.L. Brown, and R.R. Cocking (Eds.). In attending to the framework itself, we expanded Chapter 9: Integrating the Three Dimensions, which in the draft included only examples of performance expectations; for example, we added an example of how the dimensions might be brought together in curriculum and instruction. In considering whether acknowledge, however, that the mathematics common core does not include such topics as algorithms or algorithmic approaches to computation and includes very little about the use of computational tools. Each of these communities mounted some kind of formal response, including letters from professional societies and campaigns to encourage their membership to respond to the online survey. × the Centre for Informal Learning and Schools. The letter also pointed out that a corps of technology teachers at the secondary level already exists. Smith, C.L., Solomon, G.E.A., and Carey, S. Individuals could submit comments through an online survey. He has a B.A. in psychology from Colgate University and M.A. and Ph.D. degrees from the University of Colorado. Over 30 focus groups were held around the country by 24 organizations, with a total of over 400 participants. × Page 341 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Although the committee determined that it was not appropriate to include computer science in the framework as a separate discipline with its own set of core ideas, in the revisions of the draft we made an effort to stress the importance both of computers as scientific tools, particularly in Chapter 3: Scientific tools collaborative and has led to new technologies to improve the early detection of cancers and other diseases, especially in impoverished settings. Herschbach is emeritus professor in the Department of Chemistry and Chemical Biology at Harvard University and professor of physics at Texas A&M University during the fall term. New York: Routledge. His research focus is a mix of work on policy and pedagogy in the teaching and learning of science. 95-132). Science Education, 36(3), 162-168. Schweingruber is the deputy director of the Board on Science Education, 36(3), 162-168. Schweingruber is the deputy director of the Board on Science Education, 36(3), 162-168. Schweingruber is the deputy director of the Board on Science Education at the National Research Council (NRC). × A SUMMARY OF PUBLIC FEEDBACK AND SUBSEQUENT REVISIONS The committee recognized early in the process that obtaining feedback from a broad range of stakeholders and experts would be crucial to the framework's success. × focuses on how teachers and young children build communities of scientific discourses and practices in the early years of schooling. Page 3 11. Previously, he was professor of curriculum and instruction at the University of Wisconsin-Madison and the director of diversity in mathematics education. Mahwah, NJ: Lawrence Erlbaum Associates. She has worked in some capacity Page 363 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Concepts of magnetism held by elementary school children. All rights reserved. In cases in which the committee chose not to revise or to make only a limited revision, we explain why this choice was made. He has an administrative supervisory certificate from Utah State University; a B.S. in chemistry from the University of Utah, Salt Lake City; and an M.Ed. from Weber State University. He has an Sc.B. in geophysics from Brown University and a Ph.D. from Northwestern University. Linguistics and Education: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. 1,127-1,134). At the National Research Council, she served on the Committee on Being a Scientist: Responsible Conduct in Research. There was general concern that the expectations for the 3-5 and 6-8 grade bands were quite high, given the number of very important, but challenging, ideas that were covered. He received the Innovation Award of the St. Louis Science Academy and the Distinguished Faculty Award of Washington University. Page 2 REFERENCES 1. She is a former president and founder of the nonprofit Contemporary Physics Education Project. She was elected to the National Academy of Sciences in 1997. He has a B.S. in molecular evolution and Page 356 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Images provided by ©1996 PhotoDisc, Inc./Keith Brofsky; test tubes holding colored liquid, ©2003 Comstock Inc. NRC staff and the committee chair reviewed this input, developed summaries identifying the major issues raised, and outlined possible revisions. 6. Expert feedback from individuals and focus groups was particularly helpful in guiding the revisions of these four chapters. The second core idea, which stresses the connections among engineering, technology, science, and Page 338 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. 39-74). Life Sciences. (2007). National Academy of Engineering. There was concern that the progressions were presented as many discrete bits of knowledge, which seemed to promote memorization of facts. Some felt that there was too much introductory material about the work of scientists and engineers generally Page 341 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Response We chose not to delete or add to the crosscutting concepts. John C. A number of criticisms stated that the progressions were not always grade appropriate; some pointed out that material included in the K-5 bands in particular was often too difficult. In 2005, he had a distinguished lectureship with the Incorporated Research Institutions for Seismology and the Seismological Society of America. We summarize this feedback below and describe the revisions that were made in response. Kokkotas, P., Vlachos, I., and Koulaidis, V. Meanwhile, the introductory discussion of each core idea was expanded into a single coherent statement that reflected the idea's overall knowledge content. Polanyi for their contributions concerning the dynamics of education at the University of Illinois at Chicago (UIC). He led the project on Enhancing the Quality of Argument in School Science Education) materials to support teacher professional learning were developed. Physicists expressed concern that the content in physics was not articulated clearly, and chemists had a similar concern about the chemistry ideas. For example, six experts on learning science in grades K-5 provided detailed input regarding what ideas were appropriate for those who provided detailed input regarding what ideas were appropriate for those who provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those who provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding what ideas were appropriate for those levels and in which grades K-5 provided detailed input regarding k-5 provided k-5 prov comments liked the framework's inclusion of crosscutting concepts. Tracing a Prospective Learning progression for the nature of matter. He served a term as president of the Council of State Science Supervisors and of the Maine Curriculum Leaders Association. (2006). When necessary we consulted experts in teaching and learning science to supplement the committee's expertise. Moulding received the Governor's Teacher Recognition Award, the Presidential Award for Excellence in Mathematics and Science Teaching, and the Award of Excellence in Government Service from the Governor's Science and Technology Commission. Washington, DC: National Academy Press. He is currently co-chair of the planning committee to develop the National Assessment of Educational Progress's technology framework. They noted that it would not emerge simply through engaging with practices. Taking Science to School: Learning and Teaching Science in Grades K-8. He won the Nobel Prize in physics jointly with George Smoot for their work on the Cosmic Background Explorer Satellite (COBE). He has a Ph.D. in education in human cognition and development from the University of California, Berkeley. Acknowledging that developing a separate set of core ideas would take time, they asked that the framework's project time line be extended accordingly. From 1986 to 2007, he held several positions in K-12 education, including director of secondary instruction and state science supervisor for the Maine Department of Education. We did this because design is the one core idea of engineering around which there appears to be consensus [2]. Response We added explicit reference to other subject areas in multiple places. Wyatt W. National Research Council. He won the 1986 Nobel Prize in chemistry jointly with Yuan T. Learning about statistical covariation. Many suggested that the section titled "Topics in Science, Engineering, Technology, and Society" did not fit in this dimension and should be integrated elsewhere. In the policy domain, he is interested in exploring students' attitudes toward science and how school science and how school science can be made more worthwhile and engaging, particularly for those who will not continue with the study of science. × This page intentionally left blank. He has a Ph.D. in cognitive science (1983). Paper commissioned by the National Academies Committee on Test Design for K-12 Science Achievement. Lyons, and J. Elements of design are now represented in Chapter 3: Scientific and Engineering Practices and also under the first core idea in Chapter 3: Scientific and Engineering Practices and also under the first core idea in Chapter 3: Scientific and Engineering Practices and also under the first core idea in Chapter 8: Engineering, Technology, and Applications of Science. × However, there were numerous concerns, including the amount of space devoted to engineering and technology, the kinds of core ideas included, and the capacity of the K-12 science education system to get these areas right. × that participated in the focus groups and those that submitted letters are provided at the end of this summary. 16. × Page 5 Page 331 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. A theoretical physicist, she was elected to the National Academy of Sciences in 2003 and was president of the American Physical Society in 2004. Investigating the Influence of Standards: A Framework for Research in Mathematics, Science, and Technology Education. 5. × Page 360 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. He has an A.M. in physics and a Ph.D. in chemical physics from Harvard University. Response In the introductory chapter, we clarified the vision for the framework and its emphasis on science for all students. Moulding is director of the Utah Partnership for Effective Science Teaching and Learning, a five-district professional development collaborative. At the National Research Council, he served on the panel authoring the report Taking Science to School. Pages: 1 (bottom right) iStockphoto; 9 TERC (all TERC images are video stills from the Talk Science Project); 24 Bigstock; 29 American Images Inc.; 47 Bigstock; 57 Science Museum of Minnesota; 64 iStockphoto; 117 iStockphoto; 122 NASA Goddard Space Flight Center Solar Dynamics Observatory, image AIA 304; 129 iStockphoto; 131 Fotosearch; 136 iStockphoto; 151 iStockphoto; 157 PhotoAlto; 172 NASA/JPL-Caltech; 174 NASA; 177 Tom Keller; 181 iStockphoto; 187 PhotoDisc; 189 iStockphoto; 151 iStockphoto; 15 iStockphoto; 206 iStockphoto; 208 iStockphoto; 213 Fotosearch; 229 TERC; 234 iStockphoto; 244 TERC; 253 TERC; 260 TERC; 261 TERC; 263 TERC; 261 TERC; 263 TERC; 261 TERC; 263 TERC; 261 TERC; 263 TERC; 261 TERC; 261 TERC; 263 TERC; 263 TERC; 263 TERC; 263 TERC; 264 Getty Images; 318 TERC. × Page 364 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Some thought that, for certain component ideas, the connections from grade band to grade band were unclear. He is also the senior project scientist for the James Webb Space Telescope. Hidi, S., and Renninger, A. Palmeri, A., Cole, A., DeLisle, S., Erickson, S., and Janes, J. This suggested the need to be more explicit about how engineering and technology are related to each other and to the natural sciences. Inclusion of Engineering and technology The inclusion of engineering and technology are related to each other and to the natural sciences. readability. Behavioral and Social Sciences. Catley, K., Lehrer, R., and Reiser, B. Others said that the document would be difficult for teachers to use. × Response The committee was especially attentive to the feedback on the learning progressions. A number of reviewers suggested placing more emphasis on an "earth systems" approach; this suggestion was particularly emphasized by the ocean science community. × Page 340 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. He was co-principal investigator in the Center for Curriculum Materials in Science, exploring the design and enactment of science curriculum materials. Lemke, J.L. (1990). Response The committee made several revisions aimed at giving the framework greater focus, clarifying its goals and audience(s), and eliminating differences in tone and writing style. The detailed progressions were changed to grade band endpoints, with the number of details significantly reduced. Science for all, including students from non-English language backgrounds. The Georgia Performance Standards have taken the state in a new direction in education with an emphasis on conceptual learning and inquiry. Mather is a senior astrophysicist at the U.S. space agency's (National Aeronautics and Space Administration) Goddard Space Flight Center in Maryland and is an adjunct professor of physics at the University of Maryland, College Park. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, St. Louis, MO. Dodrecht, the Netherlands: Kluwer Academic. He has been awarded the Presidential Award in Ecology from the secretary of environment of Mexico. Teaching and Teacher Education, 5(1), 1-20. Measurement: Interdisciplinary Research and Perspectives, 4, 1-98. × an M.S. in population biology from the University of Georgia and a Ph.D. in science literacy and education from Rockefeller University. Keller has also served on the National Science Teachers Association board of directors. Lists of the organizations Page 332 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. His current work is focused on analyses of complex learning and instructional environments, including those incorporating powerful information technology tools, with the goal of better understanding the nature of student learning and the conditions that enhance deep understanding. Weiss, I.R. (2006). Page 334 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. We received a similar request for inclusion from the computer science community. 49. Page 335 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. There was an argument for greater inclusion of ocean sciences in the earth and space sciences section. At the National Research Council, he has served on the Communications Advisory Committee. × and co-chaired the Committee on Learning Science in Informal Environments. He has a B.S. in mathematics and an M.S. in chemistry from Stanford University. Smith, D.C., and Neale, D.C. (1989). We have made appropriate clarifications in the introductory chapter and in the guidance for standards developers. × on most of the major projects of the board since it was formed in 2004. × Suggestions of Fields or Topics to Be Included Several stakeholder groups voiced strong concerns that content relevant to their disciplines was either underrepresented or left out entirely. You can add them to that request at any time. We also created a chapter on implementation issues (Chapter 10) that spelled out the need for curricula and instruction that integrate the three dimensions. Responders offered specific examples of ideas in the learning progressions that seemed developmentally inappropriate—that would require understanding of Page 343 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. At the National Research Council. At the National Research Council, he has served on the Board on Testing and Assessment and co-chaired the Committee on the Cognitive Science Foundations for Assessment, which issued the report Knowing What Students Know: The Science and Design of Educational Assessment. We also acknowledge the diligent efforts of the schools' partner organizations as they seek to improve the quality of K-12 science education, both locally and nationally. His research interests include evolutionary genetics of mating behavior and chromosomal polymorphisms of the Drosophila species, evolutionary genomics of Drosophila, and science education and minority participation in college science curricula. But although we had planned a chapter related to implementation, it was not available for the 2010 draft release. Center for Education. I.R. Weiss, M.S. Knapp, K.S. Hollweg, and G. Shulman, L.S. (1986). revised language throughout the report to note the role of behavioral and social sciences expertise for addressing such issues as the connections among science, technology, and society. × PHOTO CREDITS Special thanks to the students and teachers of the following schools and school districts for inviting photographers into their science classrooms and for allowing the images of students' investigations to be included in this volume. Cultural Studies of Science Education, 4(1), 51-66. Systems for State Science Assessment. Journal on Research in Science Education, 4(1), 51-66. 2010. She is devoted to science communication, teaching students at all levels in the university, presenting numerous workshops and field trips for K-12 teachers, and consulting for the written media, museums, television, and video producers. A special concern of his research is the incorporation of effective formative assessment practices, assisted by technology, to maximize student learning and understanding. Educational Researcher, 15(2), 4-14. Page 333 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Implications of research on children's learning for standards and assessment: A proposed learning progression for matter and the atomic molecular theory. Haupt, G.W. (2006). He is a co-principal investigator of COSEE-Ocean Learning Communities (. Cambridge, MA: MIT Press. Anderson is the alumni foundation distinguished professor in the Genetics Department at the University of Georgia. Moschkovich, J.N. (2002). Pruitt is the chief of staff for the Office of the State Superintendent of Schools in the Georgia Department of Education. × Page 6 Physical Sciences Ashbrook, P. She led the effort to establish the Purdue School of Engineering Education, the first department at a U.S. university focused explicitly on engineering education, particularly on K-12 engineering curricula, standards, and teacher Page 359 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Corcoran is co-director of the Consortium for Policy Research and Education (CPRE) at Teachers College of Columbia University. To enable readers to identify the major tasks for standards developers in translating the framework into standards Developers. Previously, she was the director of research for the Rice University School Mathematics Project. Lee, O., and Buxton, C. Others thought that too many discrete practices with no uniform "grain size" were specified. Our disciplinary experts, who gave thoughtful input based on research on learning, suggested greater stress on the physical, chemical, and molecular bases of biological processes, at least in the higher grades. He has a B.S. in chemistry from North Georgia College and an M.Ed. from the State University of West Georgia. In the position of director of the Division of Academic Standards, he supervised the implementation of all content areas' new curriculum. The secondary reason is that the committee has a responsibility to meet its charge and to maintain as closely as possible the intended time line of its work in order to inform the science standards development efforts of Achieve, Inc. He has an Ed.D. in science education from the University of Massachusetts and has experience teaching high school science. In addition to her scholarship in physics, she has had long-term involvement in science education of science teachership in physics. In K. Learning Progressions Many concerns were expressed about the draft learning progressions—the sections in Chapters 5-8 now labeled "Grade Band Endpoints." Several people, including some of the individual experts we asked to comment, objected to the term "learning progressions" for these sequences. She is a fellow of the American Geophysical Union and the Geological Society of America and was a co-winner of the Newcomb Cleveland Prize of the American Association for the Advancement of Science. The assessment of students and teachers' understanding of gas laws. He taught chemistry for 20 years at Roy High School in the Weber school district and served as the district science teacher leader for 8 years. × Page 342 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Aside from a small subset of responders who wanted to eliminate evolution, overall the response to the life sciences core ideas was positive. × concepts from other disciplines or that were actually introduced in later grades. Appropriating scientific practices and discourses with future elementary teachers. (2009). Science Learning and Instruction: Taking Advantage of Technology, with some individuals suggesting that they were inappropriate to include in the physical sciences. (1986). 21. Tzou, C., and Bell, P. 45. What's the matter with teaching the Prospects. Previously, she served as provost and vice chancellor for academic affairs at the University of Illinois at Urbana-Champaign, the John Edwardson dean of engineering and professor of electrical engineering Science Education, 86(3), 287-313. Greenwich, CT: Information Age. × Page 345 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions, and they had the opportunity to examine the public feedback in detail. Although the framework does not include material usually covered by courses under the title "computer science," we stress that this choice in no way diminishes the importance either of general computer science," we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science," we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science," we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science," we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general computer science, "we stress that this choice in no way diminishes the importance either of general comput curriculum development and research interests have focused on helping students unravel their misconceptions in science and on new ways to link science and on new ways to link science centers and schools to promote students' understanding of the infinite divisibility of number and matter. Many indicated that they were pleased to see engineering and technology given an explicit place in K-12 science education. Brett D. Common Core State Standards Initiative Home Page. 42. Some pointed out that, without guidance about integration, the crosscutting concepts might be omitted entirely or be taught as a set of separate ideas. Linn, M., and Eylon, B.-S. Developing Preservice Teachers' Content Knowledge and PCK of Models and Modelling. and Perlman, L. Burrill (Eds.). Journal of Research in Science Teachers' Content Knowledge and PCK of Models and Modelling. Subsequent Revisions." National Research Council. He is co-director of UIC's interdisciplinary Learning Science standards. Available: [June 2011]. He has taught science at the middle and high school levels in California, Maine, Costa Rica, and Micronesia. • We included some behavioral and social sciences examples in the descriptions of science and in the chapters on crosscutting concepts and scientific and engineering practices. Smith is assistant professor in the Department of Curriculum and Instruction at Pennsylvania State University. Journal of Research in Science Teaching, 47, 687-715. × Page 336 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Practices for K-12 science education and with providing examples of the integration of these ideas and practices. (2002). Bang, M., and Medin, D. P. Stephen L. Some had difficulty understanding how the tables in the chapter that described progressions were to be used in conjunction with the tables outlining the learning progressions for the disciplinary core ideas. Feher, E., and Rice, K. He was associate director and co-principal investigator of Promoting Science among English Language Learners (P-SELL) with a High-Stakes Testing Environment, associate director and co-principal investigator of Science Made Sensible, and a member of the University's social sciences institutional review board. Secada is senior associate dean of the School of Education and chair of the Department of Teaching and Learning at the University of Miami (UM). Science Education, 92(4), 608-630. 52. He is the current president of the Council of State Science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science discourse. During the 3-week public comment president of the Council of State Science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science discourse. Burling the 3-week public comment president of the Council of State Science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science discourse. Burling the 3-week public comment president of the Council of State Science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science Supervisors. 19. "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science Supervisors. 19. "It isn't no slang that can be said about this stuff". individuals and groups. The community developed some standard wording for members to use in filling out the survey. × education. 44. Briars, D.J., and Resnick, L.B. (2000). Board on Testing and Assessment, Center for Education. 44. Briars, D.J., and Resnick, L.B. (2000). presents a set of 13 recommendations that lay out the steps that standards. Custer, Illinois State University, Normal Jacob Foster, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, State University, Normal Jacob Foster, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Department of Elementary and Secondary Education, Malden Yvonne Spicer, Massachusetts Departmentary and Secondary Education, Malden Yvonne Spicer, Massachusetts Departmentary and Secondary Education, Malden Yvonne Spicer, Massachusetts Departmentary and Secondary Education, Malden Yvonne Spicer, Massachusetts De National Center for Technological Literacy, Museum of Science, Boston Maurice Frazier, Chesapeake Public School Systems; Heredity; Organisms, living) information resources for framework, 141, 349-351 patterns in, 139, 152 155 public feedback on, 342 scale, proportion, or quantity in, 100, 139, 140, 143, 144 Light, 70, 89-90, 104, 106, 112, 113, 114, 115, 116, 121, 122, 123, 125, 128, 130, 131, 133-135, 136, 137, 147, 148, 149, 151, 153, 174, 189, 222, 223 (see also Electromagnetic radiation; Photons; Waves) Literacy, science (see Communicating information; Reading science texts; Terminology and language of science) M Magnets and magnetic fields, 116, 117-118, 121, 123, 126, 174, 180, 227, 233, 234, 236 Massachusetts Department of Education, 344 Mathematical representations, 56, 57, 65-66, 86, 91 Mathematics and computational thinking, 49 applications, 64-65 communicating information through, 64, 74, 206 data analysis and evaluation, 61, 62, 63, 65, 66 engineering, 51, 65, 66 engineering, 51, 65, 66, 86, 94 scale and, 91 scientifications, 64, 65, 66 engineering, 51, 65, 66 engine 118, 121, 122, 123, 124, 125, 134, 135-136, 140, 143, 153-154, 173, 225, 227, 229, 230, 233, 236-237, 238, 239-240, 303 chemical reactions, 106, 109-111, 112, 120-121, 123, 124-126, 128, 148, 153, 154, 175, 222, 223, 226, 228, 230, 233-234, 236, 238 crosscutting concepts, 84, 93, 94-96 cyclic, 96, 110 ecosystem transfers of, 140, 147, 148, 150, 152-154, 189, 223 electrical attractions, 107 engineering design and, 95 grade band endpoints, 108-109, 110-111, 113, 147-148, 230-240 incorrect beliefs and misconceptions, 96 learning progression, 95-96, 230-240 models, 58, 95, 97-98, 106, 108, 109 performance expectations example, 224-229 periodic table of elements, 106, 109, 227, 239 stability and change, 109 state changes, 70, 107, 108, 109, 120-122, 123, 124-126, 128-129, 147, 148, 109, 120-122, 123, 124-126, 128-129, 147, 148, 109, 110, 120-122, 123, 124-126, 128-129, 147, 148, 108-109, 120-122, 123, 124-126, 128-129, 147, 148, 108-109, 120-120, 120-150, 152-154, 169, 179, 223, 239 terminology, 96 water cycle, 95 Maxwell's equations, 64 Measurement and units, 90-91, 205, 231 Measurement of Education, 344 Mitosis, 145, 146 Model-It, 59 Modeling/models (see also Systems and system models) assumptions and approximations in, 93, 94 cause-and-effect mechanisms, 79, 86, 88, 93, 221, 229 Page 10 Page 385 Share Cite Suggested Citation:"Photo Credits." National Research Council. Cognition and Instruction, 21(1), 1-78. Rodolfo Dirzo is professor of biology at Stanford University. They pointed out that courses related to the behavioral and social sciences are already included at the secondary level (e. × Chapter 8: Engineering, Technology, and Applications of Science, and elsewhere as appropriate, we have stressed linkages to social studies. Children's Mathematics. separate standards for the Page 339 Share Cite Suggested Citation:"Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. M.R. Wilson and M.W. Bertenthal (Eds.). × Page 359 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. He has a B.A. in physics from Swarthmore College and a Ph.D. in physics from the University of California, Berkeley. He is a member of the Third World Academy of Sciences. Page 7 Page 355 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Although the committee did not think it was appropriate to include the behavioral and social sciences as a separate discipline, we did make efforts to discuss them explicitly throughout the document and particularly to identify places where they intersect with the framework's three dimensions. 47. The Essential Elements of Standards-Based School Improvement. Although we have reduced the number of core ideas in Chapter 8: Engineering, Technology, and Applications of Science, we also noted that different amounts of instructional time, both within and across grade levels; thus, the above-cited accounting was not a correct interpretation of the document. Computer Science. Some commenters said explicitly that the framework had gone too far toward standards. He directs the ethnographic and design-based research of the Everyday Science and Technology Group as well as the University of Washington Institute for Science and Mathematics Education, which cultivates innovative projects in P-20 education in science, technology, engineering, and mathematics between university groups and community partners. × Page 356 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. He is currently completing a Ph.D. in chemistry education from Auburn University. Cognitive Psychology, 51, 101-140. Available: [June 2011]. One of the eight major practices is labeled "Using Mathematics, Information and Computer stresses the importance of the application of these skills throughout science learning. There also was mention of health, but this involved a less organized response. As director of the U.S. Department of Education's Hispanic Dropout Project, he was senior author of its final report, No More Excuses. Walter G. × C BIOGRAPHICAL SKETCHES OF COMMITTEE MEMBERS AND STAFF Helen R. × Page 339 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. CSE Technical Report 528. At the National Research Council, she served on the Teacher Advisory Council and was a consultant for the popular publication, Ready, Set, Science! She has a B.S. in biology from Boston University, an M.A.T. in science education from the Harvard Graduate School of Education, and a Ph.D. in curriculum and instruction from the University of Delaware. A tropical forest ecologist and conservation biologist, he has performed seminal work on evolutionary ecology. × Response Behavioral and Social Sciences. Diversity and Equity in Science Education: Theory, Research, and Practice. Brian Reiser is professor of learning sciences in the School of Education and Social Policy at Northwestern University. Her research has concerned various aspects of plate tectonics. He served on the Triangle Coalitional Board and the National Assessment of Educational Progress 2009 Framework Planning Committee and was the president of the Council of State Science Supervisors from 2003 to 2006. At the National Research Council, she was a member of the Conter for Education Advisory Board. Thomas E. In J.E. Brophy (Ed.), Advances in Research on Teaching, Volume 2: Teachers' Subject Matter Knowledge and Classroom Instruction. × fellowships from the Kemper and Lily Foundations. National Academy of Engineering and National Research Council. Too Much Material Many individuals and organizations indicated that the draft framework still contained too much material, and some thought that the committee had not succeeded in making any reduction compared with previous documents. Experts we asked to review the draft also pointed out that discussion of applications of science was mostly absent there. He was a member of the NRC's Committee on Science Education K-12 and the National Science Education Standards and Assessment, which produced the National Science Education Standards. The construction of subject matter knowledge in primary science teaching. The draft underwent an expedited NRC review in early July 2010 and was posted online on July 12 for a 3-week period. (1996). Some individuals commented that including engineering and technology could present a problem: given that a goal of the framework is to cut the amount of material considerably. × we were advocating that 25 percent of time be devoted to engineering. Stevens, S.Y., Delgado, C., and Krajcik, J.S. (2009). 23. Strengthening Connections to the Common Core Standards, and some wanted to see more indications of the links between the core ideas and other disciplines. Many of those who provided comments thought that the "nature of science" needed to be made an explicit topic or idea. Magnusson, S., Krajcik, J., and Borko, H. × Page 338 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Several responders indicated that there were too many component ideas in this domain, and they offered concrete suggested Citation:"Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. She has a Ph.D. in medical physics and an M.S. in physics from the Massachusetts Institute of Technology. 12. Cobb, P., McClain, K., and Gravemeijer, K. They also noted many places where the social science, technology, and society. International Journal of Science Education, 20(3), 291-303. In his current role, Keller is co-director of an NRC study committee that is developing a conceptual framework to guide new science education standards. Smith, D.C., and Anderson, C.W. (1999). He recently helped the College Board build new frameworks for curriculum, instruction, assessment, and professional development in Advanced Placement biology, chemistry, physics, and environmental science. 53. Science Education, 79(6), 637-666. Lee and John C. Some individuals thought that the organization of the core and component ideas in the earth and space sciences was less conceptually coherent than in the other disciplines. Mathematical Thinking and Learning, 4(2-3), 189-212. Cognition and Instruction, 21(4), 475-520. After discussions at its fifth and sixth meetings, the committee made substantial revisions to the framework based on the feedback. (2003). Radinsky (Eds.), Learning in the Disciplines: Proceedings of the 9th International Conference of the Learning Sciences, Volume 1 (pp. Barton, A.C., Tan, E., and Rivet, A. × National Science Board from 1991 to 1996. Thoughtful advice from the experts we consulted was that some of the engineering and technology ideas incorporated elements that would be more appropriately placed in practices. Implementation: Curriculum, Instruction, Teacher Development, and Assessment Many educators raised concerns about the challenges to implementing the framework—especially the demands it would place on curriculum development, and others. His research interests have included equity in education, bilingual education, bilingual education, school restructuring, professional development, and reform. National Committee for Science Education: Practices, Crosscutting Concepts, and Core Ideas. (2011). They pointed out that computer science and programming courses are already part of the K-12 curriculum, although they are not usually identified as part of the science curriculum. He also served on the editorial boards of Science Education and the Journal of the Learning Sciences. Tai, R.H., Liu, C.Q., Maltese, A.V., and Fan, X. Response The committee deliberated extensively on the best way to respond to these concerns and chose to make significant revisions. 2. (2010). Others thought that the progressions underestimated what younger students can do. × Page 333 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. × Page 363 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Philip Bell is associate professor of the learning sciences and the Geda and Phil Condit professor of science and mathematics education at the University of Washington. Critique focused on (a) elements perceived as missing or underemphasized, particularly regarding psychology and behavior, and (b) elements perceived as missing or underemphasized. appropriateness. Finally, the committee asked a number of disciplinary experts to provide detailed feedback on the draft from their own particular perspectives. A related issue among respondents was treatment of the applications of science (such as medicine, public health, and agriculture) and their links to engineering and technology. (2004). Page 336 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. He chaired the Carnegie Corporation report The Opportunity Equation. During the past 10 years, Sneider was vice president for educator programs at the Museum of Science in Boston and previously served as director of astronomy and physics education at the Lawrence Hall of Science, University of California, Berkeley. Finally, there was concern that the progressions focused on the disciplinary core ideas and did not attempt to integrate the crosscutting concepts and scientific and engineering practices in any way. Kurth, L.A., Anderson, C., and Palincsar, A.S. (2002). In grades K-8, topics related to the behavioral and social sciences are typically covered in social studies, although they are not necessarily taught from a scientific perspective. This draft did not include all of the chapters intended for the final volume, although it did thoroughly address all three dimensions of the framework: crosscutting concepts, disciplinary core ideas, and scientific and engineering practices. × Page 8 Page 367 Share Cite Suggested Citation: "Appendix D: Design Team Members." National Research Council. (1998). Overall, more than 2,000 people responded to the online survey. Interactional patterns of linguistically diverse students and teachers: Insights for promoting science learning. Prior to joining the NRC, Schweingruber worked as a senior research associate at the Institute of Education where she administered the preschool curriculum evaluation program and a grant program in mathematics education. Page 355 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. In D.W. Sunal and E.L. Wright (Eds.), The Impact of Standards in K-12 Science, Mathematics, and Technology Education, Center for Education. For this reason, we secured permission from the National Research Council (NRC) to release a draft version of the framework for public comment. She teaches elementary science teacher knowledge. They also wanted to see a separate set of core ideas developed for the behavioral and social sciences and included in the framework. In pedagogy, his focus has been on making the case for the role of argumentation in science education, both as a means of improving the use of a more dialogic approach to teaching science and improving student understanding of the nature of scientific inquiry. He has a B.A. in philosophy from the University of Notre Dame and an M.S. in mathematics and a Ph.D. in education, both from Northwestern University. The committee also received letters from key individuals and organizations. Smith, C.L., Wiser, M., Anderson, C.W., and Krajcik, J. Hands On!, 24(2), 7-9. Linda P.B. Katehi is chancellor of the University of California, Davis. Jonathan Osborne holds the Shriram family professorship in science education at Stanford University. Nature of Science. Committee on Developments in the Science of Learning. Demastes, S.S., Good, R.G., and Peebles, P. To include them here would speak to a major reorganization of K-12 schooling, which would go far beyond the committee's charge and, indeed, the professional expertise of the committee. Some thought it was well written; others thought it needed to be entirely rewritten in more accessible language. 13. In 2007, while a program officer at the National Research Council, he directed the development of the award-winning Surrounded by Science: Learning Science in Informal Environments. Educational Researcher, 27(4), 12-21. COBE was the first experiment to precisely measure the black body form and anisotropy of cosmic Page 360 Share Cite Suggested Citation:"Appendix C: Biographical Sketches of Community members and Staff." National Research Council. Girls and science: A review of four themes in the science education literature. Community members wanted to see these fields acknowledged throughout the document as legitimate elements of the overall sciencific enterprise. Tanya Atwater is professor of tectonics at the University of California, Santa Barbara. Education at the Biotechnology Institute in Arlington, Virginia. 15. New York: Teachers College Press. Science Education, 72(5), 637-649. The association argued that science teachers might not have sufficient background to teach the new material and, moreover, that there is currently no agreement in the field about what the core ideas in engineering and technology should be. We discussed developmental trajectories for each practice but cut the tables and the "levels" of practice that they had introduced. De Jong, O., and van Driel, J.H. (2001). He was a Pew Scholar in Conservation and received its Outstanding Service Award: Teaching, Organization for Tropical Studies. The committee considers the behavioral and social sciences to be part of science, but for a number of reasons we think it inappropriate at this time to include them as a separate disciplinary area with its own set of core ideas. James W. Ocean Science. She has participated in or led numerous oceanographic expeditions in the Pacific and Atlantic Oceans, including 12 dives to the deep sea floor in the tiny submersible, Alvin. g., Advanced Placement psychology). Page 4 Page 329 Share Cite Suggested Citation: "APPENDIXES." National Research Council. She was the author and co-principal investigator on a 5-year grant to the Lansing (Michigan) School District and Michigan State University, in which grade-level groups of K-8 teachers studied scientific content, standards-based and inquiry-oriented curriculum design, research-based teaching practices, and their students' science learning. Response The committee was particularly concerned with this feedback and in response made significant revisions. Page 337 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. (1992). Phillip A. A letter to the committee from the International Technology and Engineering Educators Association raised a number of issues related to including engineering and technology in the science framework. Cultural processes in science framework. Cultural processes in science framework. vision across the document was lacking. (1999). (2000). We did remove "Topics in Science, Engineering, technology, and Society" from this chapter and placed the important elements of that material elsewhere (in practices; in the engineering, technology, and applications of science chapter; and in the chapter on implementation under the discussion of curriculum). Response We revised the introductory material in the chapter to make it more focused. In J. One of the major tasks of the standards and performance expectations; we anticipate that full integrate the dimensions will occur at the level of curriculum and instruction. New York: JAI Press. Currently, as the chief of staff for assessment and accountability, he supervises the development and operation of all state testing and adequate yearly progress determinations. Chapters 5-8: Disciplinary Core Ideas Many commenters provided detailed feedback on the core ideas and component ideas in each discipline. Students' conceptual ecologies and the process of conceptual change in evolution. 46. We have since written this chapter, and it is included in the present document as Chapter 10. Duke professor of mathematics at Harvard University. At the National Research Council, he has served on a number of committees, including the Committee to Review Northeast Fishery Stock Assessments and the Committee on the Release of Genetically Engineered Organisms into the Environment. Definitions of engineering, technology, and applications of science and of the relationships among them are clearly stated. Committee on K-12 Engineering Education. Klahr and S. × Page 335 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Common Core State Standards Initiative. Banks, J.A., Au, K.H., Ball, A.F., Bell, P., Gordon, E.W., Gutiérrez, K., Heath, S.B., Lee, C.D., Lee, Y., Mahiri, J., Nasir, N.S., Valdes, G., and Zhou, M. × Page 346 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. He has been a strong proponent of science education and science among the public and frequently gives lectures to students of all ages, sharing his enthusiasm for science and his playful spirit of discovery. Thomas B. Science, 312(5,777), 1,143-1,144. Lin, H.-S., Cheng, H.-J., and Lawrenz, F. At the secondary level, there are courses that do teach behavioral and social sciences topics from a scientific perspective—for example, Advanced Placement psychology. Over the past few years, Richards-Kortum and collaborators have translated these technologies from North America to both low-and medium-resource developing countries (Botswana, Brazil, India, Mexico, and Taiwan). Reiser leads the MoDeLS project (Modeling Designs for Learning Science), to develop an empirically based learning progression for the practice of scientific modeling, and BGuILE (Biology Guided Inquiry Learning Environments), developing software tools for supporting students in analyzing biological data and constructing explanations. The strongest concerns were voiced by organizations and individuals affiliated with the behavioral and social sciences, computer sciences, and ocean sciences. This community pointed to the framework's lack of specific attention to the ocean, it suggested a greater focus on earth systems than was captured in the draft, and it offered very concrete and detailed suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. In the online surveys, many individuals commented that they were impressed with the document and thought it provided a good next step toward refining standards for K-12 science education. Notably, the NRC worked closely with the National Science Teachers Association, the American Association for the Advancement of Science, Achieve, Inc., and the Council of State Science Supervisors to facilitate the public input process. We organize the discussion into two sections: overarching issues, which pertain to the draft framework as a whole, and issues relating specifically to any of the framework's three dimensions or its learning progressions. Accessing resources for identity development by urban students and teachers: Foregrounding context. Science and Children, 46(4), 12-13. Committee on Science Education. 17. Heidi A. Science and Children, 46(4), 20-23. Similarity of form and substance: From inscriptions to models. The primary reason is that these subjects are not currently part of what is considered the K-12 science curriculum. 51. Available: [June 2011]. We refined the parallel treatment of scientific and engineering practices and clarified how the goals of work in the two areas differ. He has an M.S. in mathematics from Wake Forest University and a Ph.D. in mathematics from Princeton University. Journal of the Learning Sciences, 2, 61-94. Page 346 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Commenters were divided on the tone of the document and its quality of writing.

ISSUES In general, the feedback about the draft framework indicated support for the overall approach. Portsmouth, NH: Heinemann. Life Sciences Barrett, J.E., and Clements, D.H. (2003). They offered a number of reasons for why this term should not be used and made strong cases for changing it. Hudicourt-Barnes, J. In the committee's judgment this is a task for another group. In addition, NRC staff contacted over 40 organizations in science, engineering, and education to notify them of the public comment period; they were asked to hold focus groups for gathering feedback from their members or to notify members of the opportunity to comment online. Her research Page 364 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Undertaking the task of identifying and articulating the task of identifying arti attention in the draft framework. 8. Learning Science in Informal Environments: People, Places, and Pursuits. Planning early for careers in science. 10. She served on the inaugural National Advisory Council for Biomedical Imaging and Bioengineering for the National Institutes of Health (2002-2007) and was elected fellow of the American Association for the Advancement of Science and Biomedical Engineering Society (2008). Members Scott Linneman, Western Washington University Dennis Schatz, Pacific Science Center, Seattle Don Duggan-Haas, Paleontological Research Institution, Ithaca, NY ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE Lead Cary Sneider, Portland State University, Oregon Cary Sneider is associate research professor at Portland State University in Portland State University in Portland, Oregon, where he teaches courses in research methodology for teachers in master's degree programs and consults for a number of organizations, including Achieve, Inc., the Noyce Foundation, and the state of Washington's Office of Public Instruction. × Page 334 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Overall, the committee thinks that the framework's content is now contained in a more suitable structure—one that provides guidance to standards developers rather than extremely detailed sets of discrete content statements. Quinn (Chair) is professor emerita of physics at SLAC National Accelerator Laboratory. Rebecca R. Science for All, Diversity, and Equity Many readers thought it was unclear whether this document was intended to prepare future scientists or to acquaint all students with science. × • We added more emphasis on behavior and psychology, especially cognitive sciences chapter, including a component idea on social interactions and group behavior under LS2. Rosebery, A.S., Warren, B., and Conant, F. He has been a state policy maker, a designer of programs to improve teaching, a researcher, and an adviser to governors, state legislatures, foundations, and reform organizations. Previously, he taught high school science for 12 years. 18. Committee on Test Design for K-12 Science Achievement. American Educational Research Journal, 45(1), 68-103. Carey, S. Deborah C. There was also concern about the level of detail included in the progressions; some felt that they went too far toward becoming standards. More specifically, the following changes were made in response to this input: • In the Introduction, we acknowledge that the behavioral and social sciences are part of science and that they are not broadly represented in this framework. Since 1998 he has taught policy analysis at the Woodrow Wilson School of International and Public Affairs at Princeton University. How People Learn: Brain, Mind, Experience, and School. × society, discusses applications of science as well. He was the state science education specialist and coordinator of curriculum from 1993 to 2004. National Science Education Standards. Air is a substance. Enfield, M., Smith, E.L., and Grueber, D.J. (2008). See a bug? We reframed the introductory chapter, incorporated an argument for the importance of science education, provided a concise discussion of the goals for science education for all students, and added an explicit vision statement. ORGANIZATIONS THAT CONVENED DISCUSSION/FOCUS GROUPS Achieve, Inc. People also expressed trepidation that the learning progressions in the draft contained too many discrete and disconnected notions and that some were not central to the core idea being developed. Her work has focused on translating research that integrates advances in nanotechnology and molecular imaging with microfabrication technologies to develop optical imaging systems that are inexpensive and portable and provide point-of-care diagnosis. Warren, B., Ballenger, C., Ogonowski, M., Rosebery, A.S., and Hudicourt-Barnes, J. The committee added a section to the end of Chapter 4 to emphasize the need to reflect on scientific and engineering practices as a means to deepen students' understanding of the nature of science. Lee, O., and Fradd, S.H. (1998). (2008). Let us know! Here you can also share your thoughts and ideas about updates to LiveJournal Your request has been filed. × Purpose, Audience, and Voice The feedback suggested some confusion about the purpose of the document and the intended audience. He pursues a cognitive and cultural program of research across diverse environments focused on how people learn in ways that are personally consequential to them. There were some suggestions of particular concepts to cut and of others to add. Griffiths is director emeritus and professor of mathematics at the Institute for Advanced Study, which he led from 1991 to 2003. She served as study director for a review of the National Aeronautics and Space Administration's pre-college education programs in 2007 and co-directed the study that produced the 2007 report Taking Science to School: Learning and Teaching Science in Grades K-8. Norwood, NJ: Ablex. She holds a Ph.D. in psychology (developmental) and anthropology and a certificate in culture and cognition from the University of Michigan. In the chapter on scientific and engineering practices, we included two practices that specifically link to mathematics and literacy: "Using Mathematics, Information and Computer Technology, and Computational Thinking" and "Obtaining, Communicating, and Presenting Information." In discussions of these practices, we called out the need to parallel the Common Core Standards. Bay odyans: Argumentation in Haitian Creole classrooms. Brown, B.A. (2006). Quantifying path length: Fourth-grade children's developing abstractions for linear measurement. Teaching the topic of the particulate nature of matter in prospective teachers' training courses. 41. Finally, in Chapter 12: Guidance for Standards Developers, we explicitly recommended that standards should incorporate the three dimensions in both their content statements and performance expectations. He has studied everyday expertise and cognition in science and health, the design and use of emerging learning technologies in science, culturally responsive science instruction, the use of emerging digital technologies in youth culture, and new approaches to inquiry instruction in science. Response The committee undertook significant revisions of the core and component ideas for all of the document. Also, we shifted material that described the theoretical and empirically based assumptions guiding the framework to a second chapter. Science Education, 94(6), 1,008-1,026. And there was concern that the progressions were not clearly based on research; a couple of the experts pointed out places for which research suggests realignment of the content. Talking Science: Language, Learning, and Values. She co-authored two award-winning books for practitioners that translate findings of NRC reports for a broader audience: Ready, Set, Science (2010). Several comments from individuals and summaries from focus groups called for more discussion of the goals of science education and a stronger argument in the first chapter for why science education is important. 54. 2012. He has worked on the development of a secondary school mathematics and science education is important. in curriculum and instruction, leading to the impression, for example, that Page 342 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and review of the document by committee members with expertise in elementary school science, some core ideas or component ideas were excluded at the K-2 level, with development of these ideas beginning instead in the 3-5 grade band. There also is evidence [3]. × Page 362 Share Cite Suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Lewenstein, A.W. Shouse, and M.A. Feder (Eds.). Their comments ranged from whether the inclusion of a core or component idea was appropriate, to suggested Citation: "Appendix C: Biographical Sketches of Committee Members and Staff." National Research Council. Dudley R. At the National Research Council, he served on the California State Science Standards development process. In Page 340 Share Cite Suggested Citation: "Appendix A: Summary of Public Feedback and Subsequent Revisions." National Research Council. Gomez, L. Seattle: Center for Multicultural Education, University of Washington. We trimmed the material included under engineering and technology and focused on design as one of the major elements of engineering. Those who understand: Knowledge growth in teaching. Bell, B. These definitions then inform how engineering and technology are treated throughout the framework. × practices, such as argumentation, explanation, and modeling, meaningful and effective for classroom teachers and students. Rethinking diversity in learning science: The logic of everyday sense-making. Gess-Newsome and N.G. Lederman (Eds.), PCK and Science Education (pp. Many also commented on a lack of clear statements about diversity and equity. School/School District (PA) Merck Institute for Science Education (photos by Merck Photography Services) 32, 61, 126, 146, 238, 314, 323 Parkview School (IL) Northwestern University's School of Education and Social Policy (photos by Jim Ziv) 133, 134, 249 Front cover (clockwise from top left): Sun and Earth, © 1999 PhotoDisc Inc., InterNetwork Media, Inc.; students of Japan's Osaka University operate spider shaped robots "Asterisk" AFP/Stringer/Getty Images; young explorers, © iStockphoto; female scientist working with lasers while doing research in a quantum optics lab © 1996 PhotoDisc, Inc. He carried out classical experimental studies on the ecosystem significance of biodiversity loss, fragmentation. At the same time, there were many critiques and suggestions for how to improve it. 50. We revised the structure and content of the core ideas in all of the disciplines and replaced detailed progressions with grade band endpoints for K-12 Engineering Education. × and that this discussion could be cut. These responses suggested confusion about whether the framework is intended to define a full chemistry and physics course at the high school level. 20.

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